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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/893,188	06/27/2001	Bhanwar Singh	F0654	3906

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EXAMINER

UMEZ ERONINI, LYNETTE T

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 03/11/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

AS-9

Office Action Summary**Application No.**

09/893,188

Applicant(s)

SINGH ET AL.

Examiner

Lynette T. Umez-Eronini

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 9-17 is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 4, 5, 6, 7, and 8 are rejected under 35 U.S.C. 102(b) as being anticipated by Dai (US 5,877,076).

Dai teaches a method of making a dual damascene pattern in a single etch process. As pertaining to **claims 1, 7, and 8**, the method comprises:

“substrate (**110**) . . . is provided with a composite tri-layer dielectric insulation comprising bottom and top layers (**120**) and (**140**), respectively, and a middle layer (**130**)” and “. . . photoresist (**150**) is next formed on the composite layer” (column 5, lines 46-50), which reads on,

providing a wafer having at least one insulative layer formed thereon;

“Then, a first layer of photoresist (**150**) is formed on PSG layer (**140**). It is preferred that photoresist (**150**) is a chemical amplification resist (CAR) and it is of positive (P)-type) (column, lines 18-21), which reads on,

depositing a first photoresist layer over the at least one insulative layer;

“Next, the layer of P-type CAR (**150**) is exposed through a dark field mask

(171) having a hole pattern as shown in FIG. 3b" (column 6, lines 27-29) and ". . . the hole patterned layer (150) is next hard baked at a temperature between about 110° to 130°C" (column 6, lines 46-48), which reads on,

patterning a first image into the first photoresist layer (column 6, lines 26-35); and

curing the first patterned photoresist layer

"The next layer (**160**) is a negative N-type photoresist which is next formed over the previous, and of opposite polarity, P-type CAR (**150**) as shown in FIG. 3d " (column 6, lines 55-57) reads on,

depositing a second photoresist layer over the first patterned photoresist layer;

"Using the hole pattern (**151**) in N-type layer of photoresist (**150**) as a mask, top oxide layer (**140**) is next etched to transfer the hole pattern as shown in FIG. 3g. It is preferred that the recipe used for dry etching the oxide layer in a HDP oxide etcher comprises gases Ar, CHF₃ and C₄F₈ . . ." (column 7, lines 14-17). The aforementioned suggests that transferring the hole pattern in the oxide (insulative) layer requires a single etchant (Ar, CHF₃ and C₄F₈) that passes through the second photoresist layer **160** as well as through the first photoresist layer **150** and would further read on,

etching the at least one insulative layer through the first patterned photoresist layer and the second patterned photoresist layer simultaneously in the single etch process.

Dai teaches removing said layer of photoresist is accomplished by O₂ plasma ashing and then wet stripping said photoresist using H₂SO₄, H₂O₂ and NH₄OH solutions (claim 19), which reads on,

removing the first patterned photoresist layer and the second patterned photoresist layer, in **claim 6**.

Since Dai uses the same method of using a single etchant in etching the same material through the same types of photoresist as claimed in the present invention, then using Dai's method of etching at least one insulative layer through the first patterned photoresist layer and the second patterned photoresist layer comprises employing an etch chemistry that would inherently ablate an amount of the first patterned photoresist layer during the etching process without substantially affecting the second patterned photoresist layer, as in **claim 4**. Also, using Dai's method of etching at least one insulative layer through the first patterned photoresist layer and the second patterned photoresist layer further comprises wherein the etch chemistry is highly selective to the first patterned photoresist layer and to the at least one insulative layer than to the second patterned photoresist layer, as in **claim 5**.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to

be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dai ('075) as applied to claim 1 above, and further in view of Chang (US 4,165,395).

Dai differs in failing to teach irradiating the first patterned photoresist layer with ultraviolet light, **in claims 2 and 3**.

Chang teaches. ". . . said first resist is exposed to actinic radiation in the 2Å to 5000Å range . . ." (claim 4) and "It has been found that . . . ultraviolet radiation exposure of the lower resist yields a very low amount of scattering to provide a very high aspect ratio (column 5, lines 22-24) which reads on irradiating a first patterned photoresist layer with ultraviolet light.

It would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Dai by irradiating a photoresist with UV light for the purpose of providing a resist having a very low amount of scattering to provide a very high aspect ratio (Chang, column 5, lines 22-24).

Allowable Subject Matter

5. Claims 9 -17 are allowed. Prior art fails to teach etching an insulative layer through a first and a second photoresist layer simultaneously in a single etch, wherein the a first and second image are formed in the at least one insulative layer.

Response to Arguments

6. Applicant's arguments filed December 10, 2002 have been fully considered but they are not persuasive. Applicant traverses the 102(b) rejection of claims 1, 4, 5, 6, 7, and 8 over Dai ('076) for failing to teach, etching the top oxide layer 140 to form the first (hole patter 151) and second image (line pattern 161) simultaneously in a sing etch process. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., etching the insulative layer to form a hole pattern and a line pattern simultaneously in a single etch process) is not recited in the rejected claim. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Applicant traverses the 103(a) rejection of claims 2 and 3 over Dai ('076) as applied to claim 1 above, and further in view of Chang ('395). Applicant argues that Chang fails to cure the aforementioned deficiencies of Dai. Specifically, not teaching forming a first image (patterned in a first photoresist) and a second image (patterned in a second photoresist) simultaneously in an insulating layer in a single etch process as described in the present invention. Applicant's argument is unpersuasive because Chang is relied upon only and teaches Dai's deficiency, i.e. exposing a photoresist to UV light (Chang, claim 4). In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., forming a first image (patterned in a first photoresist) and a second

image (patterned in a second photoresist) simultaneously in an insulating layer in a single etch process) is not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynette T. Umez-Eronini whose telephone number is 703-306-9074. The examiner is normally unavailable on the First Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on 703-308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are 703-972-9310 for regular communications and 703-972-9311 for After Final communications.



ROBERT KUNEMUND
PRIMARY EXAMINER

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March 8, 2003